



Project Budget Analysis Section Detail

D1 The Project Budget

The most important cost estimate given during the course of a project's life is the first one – this is the number everyone remembers. Project budgets are very difficult to establish during the predesign phase because the definitive design is not yet final. However, a realistic budget can be developed to reflect the following:

- **Project Scope** – The gross built area and volume, together with occupancy type and number of occupants in the building, set the stage for construction cost. This requires accurate identification of the functional space requirements of the agency or institution (see Appendix B).
- **Site** – Identify the costs of developing the site and accommodating the building to it (see Appendix C).
- **Schedule** – It is necessary to establish an accurate project timeline in concert with legislative funding schedules. The schedule may impact costs due to inflation factors and market conditions. Use standard escalation factors provided by the Office of Financial Management (OFM).
- **Quality and Performance Levels** – Building and systems quality levels must be established in order to achieve an adequate budget.

The construction budget sets the stage for project design and is the framework within which all design decisions will be made. The predesign budget is an estimate based on the best information known at the time – it is not a guarantee of funding or final costs.

D2 Cost Estimating Formats

To achieve consistency in evaluating agency or institution requests, a standardized format of cost reporting has been developed by OFM. Decisions affecting project costs are made throughout the budgeting, predesign, and design processes using the following methods.

D2.1 Unit Costs

During the initial budgeting phase, construction budget estimates may be prepared using single-unit costs based on broad-accommodation parameters, for example: cost per student, cost per bed, cost per square foot of gross floor area or cubic foot of building volume. Any of these or similar measures may effectively generate an approximate project construction cost. Efficiency

ratios and conversion factors for transforming net-to-gross floor areas, together with the cost per square foot of net usable area, may be useful in preparing estimates.

This information can then be tested in the predesign phase using costs per square foot of functional activities programmed for each space; for example, cost per square foot of wet laboratories versus that for offices and clerical spaces. Costs also vary based on basic criteria and design parameters of the building systems and components to be selected. Square foot building estimates are used at the budgeting phase only. As more information becomes available during predesign, schematic, design development, and construction document phases, cost estimates become more detailed.

D2.2 Unit Format

In the predesign phase, it is normal to use cost information based on the elements of each building subsystem to prepare the estimates. This method of system estimating is called the "Uniformat" system or Uniform Building Component Format. Figure C-1 illustrates the cost control and estimating system based on Uniformat down to Level 3. Level 2 cost estimating is required of all predesign document estimates. As the project moves forward into design, further detail based on the Uniformat structure should be used. For example, a Level 4 estimate should be prepared prior to bidding the project.

The Uniformat system allocates funds to the various functional areas of a facility and allows the designer to make early cost comparisons among alternatives. When life-cycle data is provided, a total cost analysis is possible.

Figure D-1
Uniformat Coding Structure

LEVEL 1	LEVEL 2	LEVEL 3	
A Substructures	A10 Foundations	A1010	Standard Foundations
		A1020	Special Foundations
		A1030	Slab on Grade
	A20 Basements	A2010	Basement Excavation
		A2020	Basement Walls
		A2030	Basement Floors
B Shell	B10 Superstructure	B1010	Floors
		B1020	Roof Construction
		B1030	Roof Coverings
	B20 Exterior Enclosure	B2010	Exterior Walls
		B2020	Exterior Windows
		B2030	Exterior Doors
C Interiors	B30 Roofing	B3010	Roof Coverings
	C10 Interior Construction	C1010	Partitions
		C1020	Interior Doors
		C1030	Fittings
	C20 Stairs	C2010	Stair Construction
		C2020	Stair Finishes
	C30 Interior Finishes	C3010	Wall Finishes
		C3020	Floor Finishes
		C3030	Ceiling Finishes

LEVEL 1	LEVEL 2	LEVEL 3
D Services	D10 Conveying Systems	D1010 Elevators and Lifts
		D1020 Escalators and Moving Walks
		D1030 Other Conveying Systems
	D20 Plumbing	D2010 Plumbing Fixtures
		D2020 Domestic Water Distribution
		D2030 Sanitary Waste
		D2040 Rainwater Drainage
		D2090 Other Plumbing Systems
		D3010 Energy Supply
	D30 HVAC Systems	D3020 Heat Generation
		D3030 Refrigeration
		D3040 HVAC Distribution
		D3050 Terminal and Packaged Units
		D3060 HVAC Instrumentation and Controls
		D3070 Testing, Adjusting, and Balancing
		D3090 Other Special HVAC Systems and Equipment
		D4010 Sprinklers
	D40 Fire Protection	D4020 Standpipe
		D4030 Fire Protection Specialties
		D4090 Other Special Fire Protection systems
		D5010 Service and Distribution
	D50 Electrical Systems	D5020 Lighting and Branch Wiring
		D5030 Communication and Security
		D5090 Other Electrical Systems
E Equipment & Furnishings	E10 Equipment	E1010 Commercial Equipment
		E1020 Institutional Equipment
		E1030 Vehicular Equipment
		E1090 Other Equipment
	E20 Furnishings	E2010 Fixed Furnishings
		E2020 Movable Furnishings
F Special Construction and Demolition	F10 Special Construction	F1010 Special Structures
		F1020 Integrated Construction
		F1030 Special Construction
		F1040 Special Facilities
		F1050 Special Controls and Instrumentation
	F20 Selective Building Demolition	F2010 Building Elements Demolition
		F2020 Hazardous Components Abatement

LEVEL 1	LEVEL 2	LEVEL 3
G Sitework	G10 Site Preparation	G1010 Site Clearing
		G1020 Site Demolition and Relocation
		G1030 Earthwork
		G1040 Hazardous Earth Remediation
	G20 Site Improvements	G2010 Roads
		G2020 Parking Lots
		G2030 Pedestrian Paving
		G2040 Site Development
		G2050 Landscaping
		G3010 Water Supply
	G30 Civil and Mechanical Utilities	G3020 Sanitary Sewer
		G3030 Storm Sewer
		G3040 Heating Distribution
		G3050 Cooling Distribution
		G3060 Fuel Distribution
		G3090 Other Site Mechanical Utilities
	G50 Electrical Utilities	G4010 Electrical Distribution
		G4020 Site Lighting
		G4030 Site Communication and Security
		G4090 Other Site Electrical Utilities
	G60 Other Site Construction	G6010 Service Tunnels
		G6020 Other Site Systems
Z General	Z10 General Requirements	Z1010 Administration
		Z1020 Quality Requirements
		Z1030 Temporary Facilities
		Z1040 Project Closeout
		Z1050 Permit, Insurance and Bonds
	Z20 Contingencies	Z2010 Design Contingencies
		Z2020 Escalation
		Z2030 Construction Contingencies

D2.3 Agency/Institution Project Request – Form C100

For the Predesign Study, Form C100 is used for traditional design-bid-build projects and alternative public works methods. This form assists in developing and illustrating costs at different stages in project development. The use of this form allows projects to be compared uniformly and consistently. The form also facilitates communications among all members of the project team, the agency or institution, OFM, and the Legislature, and allows study teams (value engineering, designers, consultants and reviewers) to quickly identify and focus on the various cost areas and provide a basis for estimating life-cycle costs.

To achieve consistency, the information required on the C100 is divided into seven standard categories:

1. Acquisition
2. Consultant Services
3. Construction Contracts

4. Equipment
5. Artwork
6. Other Costs
7. Project Management

Agencies/institutions should also include a written outline of all cost assumptions and an outline specifically describing the building systems used in preparing the costs.

Appendix E contains brief instructions for completing the C100, and Appendix F contains a copy of the form. The form can also be found at <http://www.ofm.wa.gov/budget/instructions/predesign/contents.asp>.

D3 Life Cycle Cost Analysis and Cost Benefit Analysis

Life Cycle Costing (LCC) is the process of making an economic assessment of an item, area, system, or facility by considering significant costs of ownership over an economic life, expressed in terms of equivalent costs. The essence of LCC is the analysis of equivalent costs over the design life of each alternative discussed in the Predesign Study. To ensure that costs are compared on an equivalent basis, the baseline used for initial costs must be the same as that used for all other costs associated with each alternative under study, including maintenance and operating costs. LCC techniques should be used when undertaking a cost benefit analysis. The lack of such formal procedures can lead to poor decisions or choices.

D3.1 Terminology and Examples

- **Methods** – To compare design alternatives, both present and future costs for each alternative must be brought to a common point in time. One of two methods can be used. Costs may be converted to today's dollar value by the "present worth" method, or they may be converted to an annual series of payments by the "annualized method."

The present worth method requires conversion of all present and future expenditures to a baseline of today's cost. Initial (present) costs are automatically expressed in present worth. The annualized method converts initial, recurring, and non-recurring cost to an annual series of payments. This method may be used to express all LCC as an annual expenditure.

Both the present worth method and the annualized method will result in the same economic recommendations. Because the present worth method allows easier consideration of differential escalation, it is the more common approach and is recommended for use during the Predesign phase.

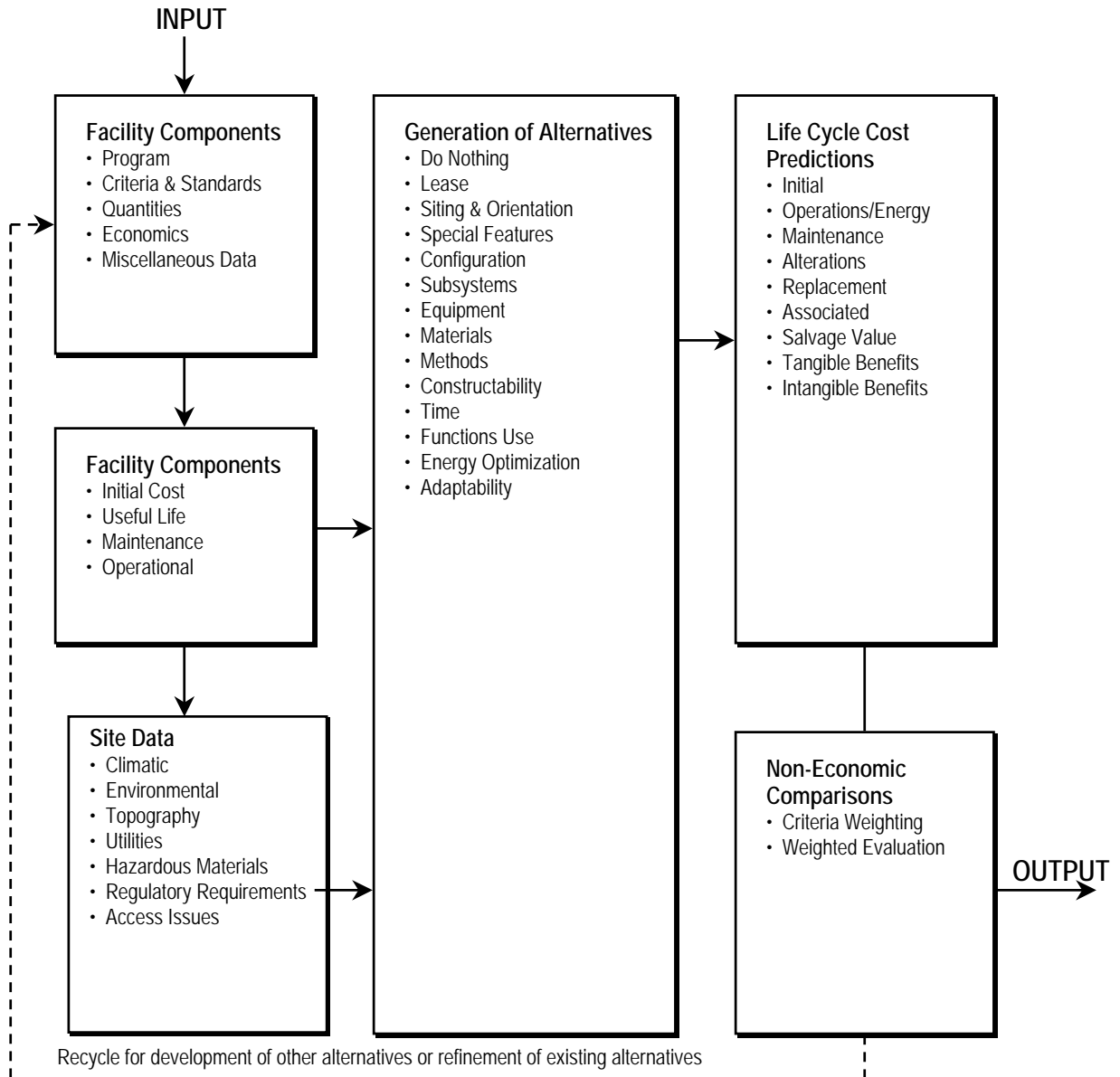
- **Discount or Interest Rate** – Calculation of present worth is often referred to as discounting. Any reference to the discount rate means either the minimum

acceptable rate of return for the owner for investment purposes or the current prime or borrowing rate of interest. Whichever rate is used in the calculations, it must be clearly identified and consistent for each alternative studied.

- **Escalation** – Escalation has a significant impact on LCC and is accommodated in LCC by expressing all costs in terms of constant dollars. For example, if the LCC is being conducted in 1998 dollars, then the purchasing power of a 1998 dollar should be used throughout the analysis. When the comparative analysis includes items with equal escalation rates, the effect of escalation will be canceled out.
- **Salvage (Residual) Value** – When evaluating alternatives with unequal useful lives during the economic life cycle period, a salvage or residual value must be established. The salvage value is the estimated value (constant baseline currency) of the system or component at the end of the economic life cycle or study period. The value of a system at the end of its useful life is normally equal to its salvage value less the cost incurred for its removal or disposal.

D3.2 Life Cycle Cost Methodology

The following illustrates a flow chart for applying LCC to a project:



The first requirement is input data. With this data, alternatives can be generated, followed by LCC predictions. From these predictions, a non-economic comparison is made to evaluate the assumptions about component costs balanced with the functional, technological, and aesthetic factors of the project. The resultant weighted choice is proposed as the optimum alternative. This is the best alternative representing the best choice balancing costs and non-economic criteria. Of the input data required, specific project information and site data are usually available (see Appendix B - Program Analysis and Appendix C – Site Analysis), but it is unusual

for facility components data to be available, especially information regarding useful life, maintenance, and operations. Although such input is needed to calculate roughly 25 percent of total costs, few analysts have access to comprehensive data in a format facilitating LCC analysis. Currently, there is no system retrieval format for LCC data readily available. However, several published documents are available that provide this data.

D2.4 LCC Formats

The format for preparing LCC analysis is included in Appendix E – Forms (also at <http://www.ofm.wa.gov/budget/instructions/predesign/contents.asp>). Although forms are available that compare specific facility components such as the type of exterior siding, this manual only includes information for preparing an analysis of complete facility alternatives – the purpose of predesign.